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I also certify that the application is now proceeding in the name as identified herein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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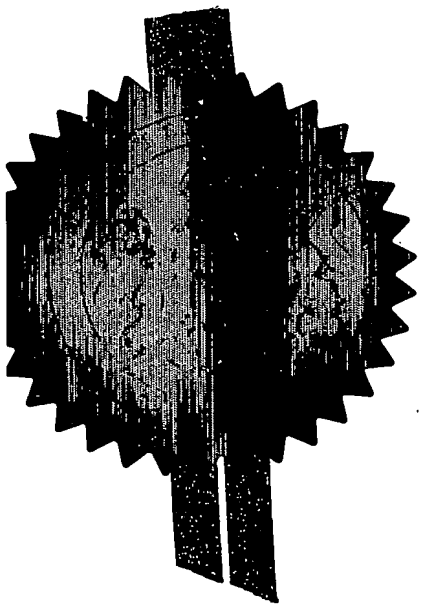

Signed Andrew Gerry

Dated 18 May 2004

GB 0308184.1

By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of:

AIRFIELD SIGNS AND MARKINGS LIMITED,
Unit 1,
Rose Business Estate,
Marlow Bottom Road,
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Buckinghamshire,
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United Kingdom

Incorporated in the United Kingdom,

[ADP No. 08846933001]

THE PATENT OFFICE
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- 9 APR 2003
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Patents Form 1/77

Patents Act 1977
(Rule 16)

1/77

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office
Cardiff Road
Newport
South Wales
NP10 8QQ

1. Your reference — PA/GJ03

2. Patent application number *(The Patent Office will fill in this part)* — 0308184.1

09APR03 E799015-1 D02697
'01/7700 0.00-0308184.1

09 APR 2003

3. Full name, address and postcode of the or of each applicant *(underline all surnames)* — [see continuation sheet]

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

(1977 ACT) APPLICATION FILED 7/

4. Title of the invention — DOCKING GUIDANCE

5. Name of your agent *(if you have one)* — GRAHAM F COLES

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

GRAHAM COLES & CO
24 SEELEYS ROAD
BEACONSFIELD
BUCKINGHAMSHIRE
HP9 1SZ

Patents ADP number *(if you know it)* — 4361556001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*
   a) any applicant named in part 3 is not an inventor, or
   b) there is an inventor who is not named as an applicant, or
   c) any named applicant is a corporate body.
   See note (d))

No

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	6
Claim(s)	
Abstract	
Drawing(s)	2 only

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	1 continuation sheet Item 3

11. I/We request the grant of a patent on the basis of this application.

Signature [signature] Date 9-04-03

12. Name and daytime telephone number of person to contact in the United Kingdom GRAHAM F COLES ☎ 01494 677181

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) *If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505*

b) *Write your answers in capital letters using black ink or you may type them.*

c) *If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*

d) *If you have answered 'Yes' Patents Form 7/77 will need to be filed.*

e) *Once you have filled in the form you must remember to sign and date it.*

f) *For details of the fee and ways to pay please contact the Patent Office.*

Continuation Sheet

Item 3. Full name, address and postcode of each applicant

7/4/04

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5533286001

SECTION 34(1977 ACT) APPLICATION FILED

ADP No

and

7/4/04

DAVID WILLIAM SAMES
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8607814001

SECTION 34(1977 ACT) APPLICATION FILED

ADP No

9-4-03

Docking Guidance

This invention relates to methods and apparatus for affording docking guidance for aircraft and other vehicles.

According to one aspect of the present invention there is provided a method for affording guidance for the docking of an aircraft or other vehicle in bringing the vehicle to a defined position in a docking station, wherein a horizontal indicator fixed relative to the docking station is viewed along an inclined line of sight from the vehicle against a background that includes a horizontal datum which is spaced at a distance behind the horizontal indicator, manoeuvre of the vehicle towards the docking station reducing visually the vertical separation between the horizontal indicator and the horizontal datum until they are visually aligned with one another when the vehicle is located in said defined position in the docking station.

According to another aspect of the invention there is provided apparatus for affording guidance for the docking of an aircraft or other vehicle in bringing the vehicle to a defined position in a docking station, comprising a horizontal indicator fixed relative to the docking station and a horizontal datum spaced at a distance behind the horizontal indicator such that when the horizontal indicator is viewed along an inclined line of sight from the vehicle against a background including the horizontal datum, manoeuvre of the vehicle towards the docking station reduces visually the vertical separation between the horizontal indicator and the horizontal datum until they are visually aligned with one another when the vehicle is located in said defined position in the docking station.

The method and apparatus of the present invention may be used for affording guidance to the pilot of an aircraft in achieving correct positioning of the aircraft in docking within an aircraft-stand of an airport terminal. In this respect, the method and apparatus may be applied for example to stopping the aircraft in the correct location relative to a passenger bridge of the docking station. The horizontal indicator, especially where an aircraft is involved, will normally be located above eye-level so that the line of sight is inclined upwardly to it, but this is not necessarily the case.

Furthermore, the method and apparatus of the invention as well as affording guidance in stopping an aircraft appropriately in its docking station may afford guidance in alignment of the aircraft within the station; for example, guidance may be afforded for manoeuvring the aircraft into alignment with the centre-line of the aircraft-stand. More especially, the method and apparatus may involve a vertical indicator which is also viewed within said line of sight, and a vertical datum spaced at said distance behind the vertical indicator such that manoeuvre of the aircraft towards alignment with the centre-line reduces visually horizontal separation between the vertical indicator and vertical datum. visually horizontal separation between them.

A method and indicator-apparatus according to the invention for affording guidance to the pilot of an aircraft in achieving correct positioning of the aircraft in docking within an aircraft-stand of an airport terminal, will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the indicator-apparatus according to the invention; and

Figures 2 to 6 are illustrative of respective indications provided by the indicator-apparatus of Figure 1 in affording guidance to the pilot of the aircraft, during different stages of docking the aircraft.

Referring to Figure 1, the indicator-apparatus 1 is contained within a weatherproof frame (not shown) that is mounted, for example on the airport-terminal building or on a stanchion, a short distance beyond the docking station on the centre-line to the aircraft stand. An upstanding front-lip 2 of a horizontal base-panel 3 of the apparatus 1 supports two spaced but horizontally-aligned indicator-bars 4 and a vertical indicator bar 5. The bar 5 extends upwardly through the gap midway between the bars 4 to project above them.

The indicator-bars 4 and 5 are formed by respective rows and columns of amber light-emitting diodes (LEDs) that are energised from an electronic-control box 6 which also serves to energise LEDs mounted on an upstanding back-plane 7 of the base-panel 3 (cable connections from the box 6 to the LEDs are not shown). More particularly, two vertical, closely-spaced bars 8 are formed on the back-plane 7 by respective columns of green LEDs which bisect a multiplicity of horizontal rows 9 of amber LEDs that are mounted one above the other on the back-plane 7. Only one of the rows 9 of amber LEDs is energised from the box 6 at any one time so as to provide a single horizontal datum-bar 10. Furthermore, only such part of each column of green LEDs from the energised row 9 down is energised from the box 6 so that the bars 8 do not extend above the datum-bar 10.

With the indicator-apparatus 1 mounted slightly above the pilot's eye-level, he/she views the amber bars 4 and 5 along an inclined line of sight from the aircraft. The bars 4 and 5 are viewed against the background of the

back-plane 7 and the aircraft is manoeuvred with the object of bringing the vertical bar 5 to lie visually between the green bars 8 and the horizontal bars 4 to lie visually on the bar 10 as illustrated in Figure 2. When this objective is achieved, the aircraft has the correct alignment and is in the correct stopping position on its stand for docking. The apparatus 1 affords guidance to the pilot for readily achieving the objective represented in Figure 2 and thereby obtaining precision in manoeuvring the aircraft to the docking station.

As the aircraft is manoeuvred towards the docking station, the pilot sees, by virtue of change of his/her viewpoint, an apparent movement of the bars 4 and 5 relative to the bars 10 and 8 respectively. Movement of the aircraft in azimuth varies visually the horizontal displacement of the vertical bar 5 relative to the bars 8 such that in the pilot's view, the bar 5 lies in the gap between the bars 8 as illustrated in Figure 3, only when the aircraft is on track along the centre-line to the docking station. In the situation illustrated in Figure 3, the aircraft is on track, but, as indicated by the vertical displacement between the bars 4 and the bar 10, is still some distance (for example 20 m) from the appropriate stopping position of the docking station.

Movement of the aircraft towards the docking station while still maintaining its centre-line track, causes the bars 4 to appear by parallax, to ascend towards the bar 10 so that in consequence of the reduction of the distance to the stopping position (for example to 10 m), the pilot's view becomes as illustrated in Figure 4. If in the same circumstances, the aircraft were to be to the left (for example 0.5 m) of the centre-line, the pilot's view would be as illustrated in Figure 5, whereas if it were half as much to the right (for example by 0.25 m) his/her view would be as illustrated in Figure 6.

As the aircraft advances towards the docking station, and the bars 4 in consequence appears to ascend progressively towards the bar 10, the pilot steers the aircraft to reduce any visual displacement of the bar 5 horizontally from the central location between the bars 8. With any deviation to left or right from the centre-line corrected, and the aircraft advanced to bring the bars 4 up onto the bar 10 as illustrated in Figure 2, the aircraft is stopped. As the aircraft closes on the stopping position, the horizontal panel 3 progressively obscures the green bars 8 so that the pilot is given an analogue display of the rate of closure.

Because manoeuvring of larger aircraft is normally carried out by the captain seated offset to the left of the fore-aft axis of the aircraft, the indicator-apparatus 1 for such aircraft will be mounted with an alignment between the bars 5 and 8 that has the corresponding offset to the left of the centre-line to the docking station. Where the second pilot seated offset to the right of the fore-aft axis, may also manoeuvre the aircraft, or both pilots are to be kept informed of progress throughout manoeuvring, this is readily and economically facilitated by addition of a second indicator-apparatus 1 mounted with the appropriate offset to the right of the centre-line. The second indicator-apparatus 1 may be energised and controlled from the same control box 6 as the first.

The control box 6 incorporates a facility that varies which of the rows 9 of amber LEDs is energised at any one time in dependence upon the type of aircraft involved in docking. The selection of which row 9 is energised to provide the datum-bar 10 is carried out automatically in accordance with data from aircraft-recognition equipment or the airport ground-control centre, or simply manually by ground-crew at the docking station. A table relating

aircraft-type to appropriate stopping position within the docking station and taking into account the height of pilot eye-level in the aircraft type, is programmed into the box 6 together with relationships between the individual rows 9 and the stopping positions they realise according to eye-level height. From the table and these relationships, the box 6 determines which of the rows 9, and consequently which of the green LEDs providing the bars 8, are to be energised to provide the appropriate horizontal datum-bar 10 and the vertical bars 8 to it, for the aircraft concerned. The brilliance of the energised LEDs providing the bar 10, and also of the LEDs providing the other bars 4, 5 and 8, is controlled from the box 6 according to weather and daylight conditions.

The apparatus of the present invention has the particular advantage that it avoids the use of complex optical systems and electronic equipment, and that it has reliability and economic benefits not enjoyed by prior proposals for docking guidance. Moreover, guidance is provided positively in a clear representational manner directly in front of the aircraft and without the need for the pilot or pilots to turn their heads away from the forward view to the docking station.

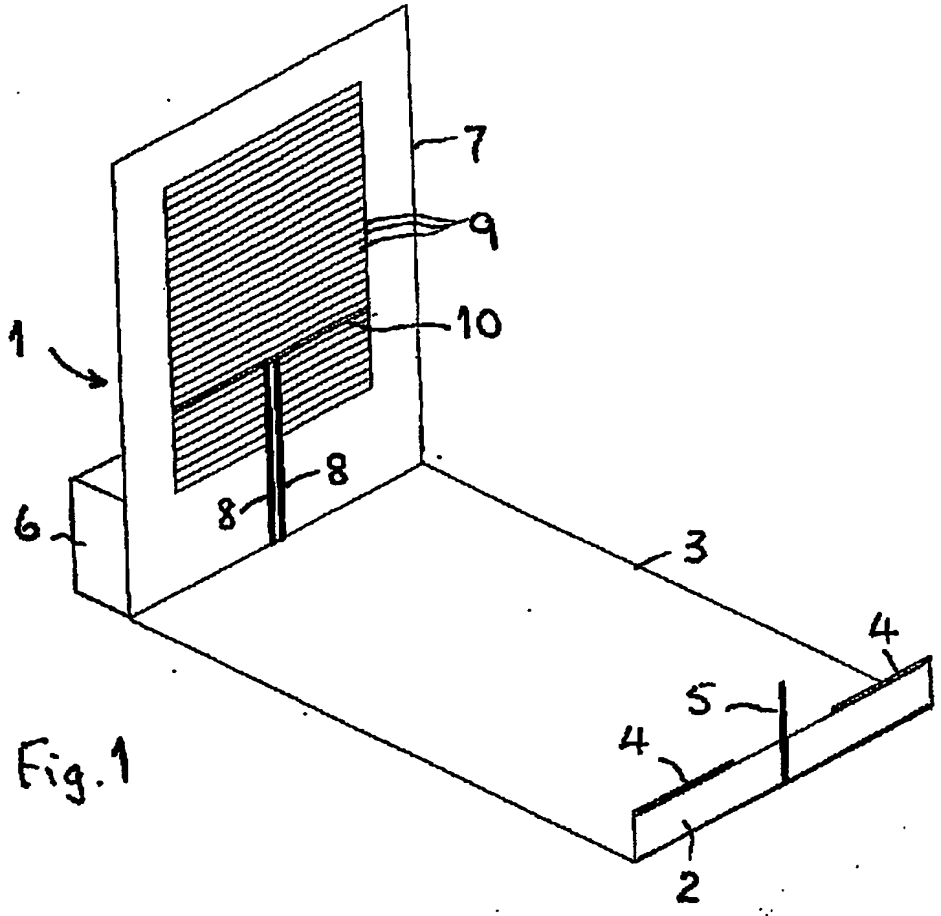


Fig.1

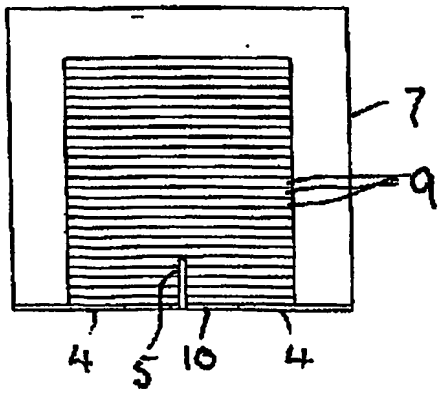


Fig.2

Fig.3

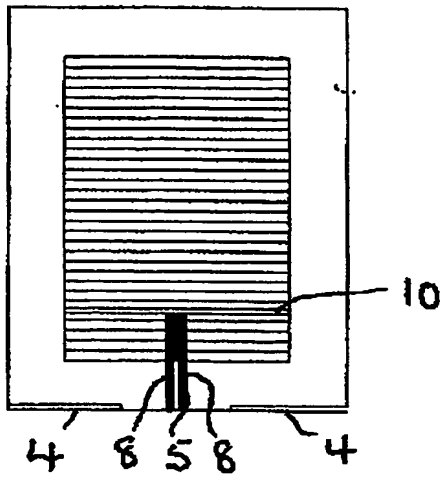
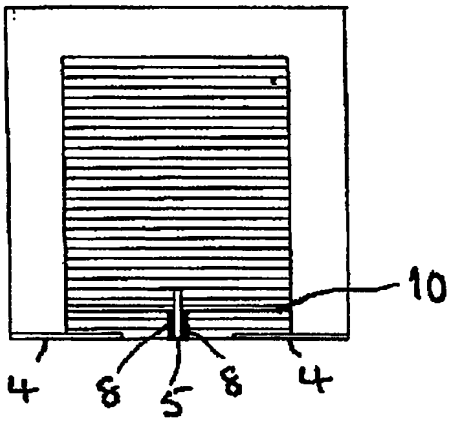


Fig.4



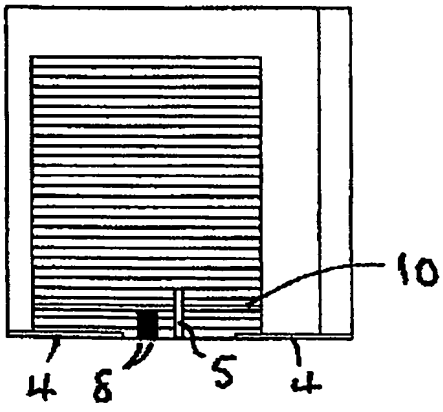


Fig. 5

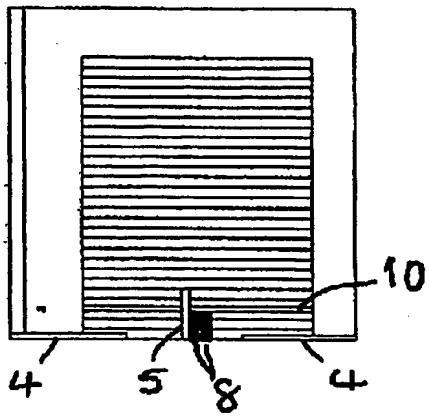


Fig. 6